

REMARKS

Claims 1-30 were originally submitted. Claims 9, 10, and 22 are canceled above, and claims 31-38 are newly submitted above. Thus, claims 1-8, 11-21, and 23-38 are currently pending.

Reconsideration and allowance of all claims is respectfully requested.

Cited References

All of the originally submitted claims were rejected in the Office Action of 12/06/01 based upon two references: US Patent No. 5,943,573 to Wen (hereinafter “Wen”) and U.S. Patent No. 6,005,776 to Holman et al. (hereinafter “Holman”).

Wen describes the fabrication of a semiconductor memory device having a typical memory layout in which word lines extend parallel to each other across a semiconductor die. Fig. 4D, to which the Examiner has specifically referred, shows parallel word lines 43a and 43b. Note, however, that neither Fig. 4D nor any other of Wen's figures show any actual contacts for connection to external components. In fact, the reference specifically notes at col. 7, lines 21-25, that certain steps, including formation of contacts, are not specifically described in the patent document. Thus, the Wen reference contains no teachings related to the location of contacts on a semiconductor die.

Holman describes a technique for mounting memory devices. Referring to Holman's Fig. 2, semiconductor components 200 are mounted vertically on a substrate 210, with connections being made by "leads" 240. The leads are permanently formed as "solder balls" (col. 3, line 55). As more specifically shown in Holman's Fig. 5, each component 200 includes a semiconductor die 510.

1 Connections between die 510 and the solder balls are formed by a flexible
2 interconnect 550.

3

4 **§ 102 Rejections**

5 Claims 1 and 4-6 have been rejected as being anticipated by Wen.

6 **Claim 1** recites, in part:

7 a plurality of channels extending between the opposite edges . . . ;
8 and

9 electrical contacts at the opposite edges of the substrate to allow
communications through the channels via the electrical contacts.

10 As mentioned above, Wen contains absolutely no disclosure relating to
11 potential locations of electrical contacts. In fact, Wen specifically states as
12 follows:

13 After this, conventional steps, including the forming of contacts,
14 metallurgy, passivation, and packaging, are carried out to finish the
product of the ROM device. These steps are standard processes in
the manufacturing process, so that description thereof will not be
further detailed.

15 Wen, col. 7, lines 21-25 (emphasis supplied).

16 This is the only mention in the Wen reference of contacts, and does not
17 specify any particular location of contacts. Accordingly, it cannot fairly be argued
18 that this reference teaches contacts “at the opposite edges of the substrate to allow
19 communications through the channels via the electrical contacts.” Thus, it is
20 respectfully argued that claim 1 as amended is not anticipated by Wen, and that
21 the rejection of claim 1 should be withdrawn.

22 **Claims 4-6**, which depend from claim 1 and present additional patentable
23 subject matter, are allowable based, among other things, on their dependence from
24 an allowable base claim.

1 Furthermore, **claim 6** has been amended to recite that the “memory devices
2 are mounted on such one or more surfaces of the substrate.” Wen does not show a
3 substrate having a surface with memory devices mounted thereon. Rather, Wen
4 contemplates memory cells formed within the substrate. Accordingly, claim 6 is
5 allowable for this additional reason.

6

7 **§ 103 Rejections**

8 Claims 2, 3, and 7-30 have been rejected as being obvious over a
9 combination of Wen and Holman.

10 **Claims 2 and 3**, which depend from claim 1 and present additional
11 patentable subject matter, are allowable based, among other things, on their
12 dependence from an allowable base claim.

13 **Claim 7** recites a first substrate having:

14 . . . a first channel portion extending across the first substrate, the
15 first substrate having opposite ends and contacts at the opposite ends
16 to allow communications through the first channel portion via the
17 contacts at the opposite ends of the first substrate;

18 Claim 7 further recites a second substrate having similar contacts “to allow
19 communications through the second channel portion . . .”

20 Neither Wen nor Holman teach or suggest substrates having contacts at
21 opposite ends as recited by claim 7. As noted above, Wen contains no teachings
22 regarding the location of contacts. Holman, on the other hand, describes
23 connections that are limited to being located along the single, bottom edge of
24 components 200. Thus, because neither of the cited references teaches or suggests
25 contacts at opposite ends of a substrate, claim 7 is not rendered obvious by any

1 combination of Wen and Holman. Accordingly, it is respectfully requested that
2 claim 7 be allowed.

3 **Claims 8 and 11-19**, which depend ultimately from claim 7 and present
4 additional patentable subject matter, are allowable based, among other things, on
5 their dependence from an allowable base claim.

6 Furthermore, **claim 19** in conjunction with its parent claim 7 recites first
7 and second connectors. The first connector engages contacts at first ends of the
8 first and second substrate, while the second conductor engages second ends of the
9 first and second substrates. This is clearly absent from either of the cited
10 references, and the Examiner has essentially admitted that this feature is absent
11 from the references. Rather claim 19 has been rejected on the assertion that “mere
12 duplication of the essential working parts of a device involves only routine skill in
13 the art,” along with a citation to *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8
14 (7th Cir. 7, 1977). It is respectfully submitted that the *St. Regis* case does not
15 establish that “mere duplication of the essential working parts of a device involves
16 only routine skill in the art” as asserted by the Examiner. Rather, the *St. Regis*
17 case relates to the long-discredited “synergism” theory of obviousness. Current
18 case law has clearly established that such “synergism” is not the true test of non-
19 obviousness. In other words, current law does not require that cited elements of an
20 invention have “an effect greater than the sum of the several effects taken
21 separately,” as the theory was stated by the *St. Regis* court. The Patent Office
22 itself has stated emphatically that synergism is *not* a requirement for patentability:

23 A requirement for “synergism” or a “synergistic effect” is
24 nowhere found in the statute, 35 U.S.C. When present, for example
in a chemical case, synergism may point toward nonobviousness, but
its absence has no place in evaluating the evidence on obviousness.
25

1 MPEP §2141, citing *Stratoflex, Inc. v. Aeroquip Corp.*, 218 USPQ 871, 880 (Fed.
2 Cir. 1983).

3 Furthermore, it is respectfully submitted that the connector arrangement
4 recited by the combination of claims 7 and 19 do not constitute “mere
5 duplication.” Rather, the two recited connectors are recited as having specific and
6 different relationships with the substrates with which they interact. Thus, this is
7 not “mere duplication” of anything shown by either of the cited references.

8 Accordingly, the rejection of claim 19 is not supported by the cited
9 references, and the rejection should therefore be withdrawn.

10 **Claims 20**, which depends ultimately from claim 7 and presents additional
11 patentable subject matter, is allowable based, among other things, on its
12 dependence from an allowable base claim.

13 **Claim 21** recites first and second memory modules having “contacts at
14 opposite ends thereof.” As already discussed, nothing in either Wen or Holman
15 teaches or suggests such a concept. Claim 21 also recites first and second
16 connectors at the first and second ends, respectively, of the memory modules. As
17 discussed above, this is not shown by the prior art and is not a “mere duplication”
18 of anything shown by the cited references. Accordingly, the rejection of claim 21
19 should be withdrawn.

20 **Claim 23** which depends from claim 21 and presents additional patentable
21 subject matter, is allowable based, among other things, on its dependence from an
22 allowable base claim.

23 **Claim 24** recites

24 arranging contacts at the opposite edges of the substrate to allow
25 communication through the channel portions;

1 Again, as already discussed, above, neither of the references discusses
2 contacts at opposite ends as recited. Accordingly, claim 24 is allowable over the
3 cited prior art.

4 **Claims 25-30**, which depend ultimately from claim 24 and present
5 additional patentable subject matter, are allowable based, among other things, on
6 their dependence from an allowable base claim.

7

8 **Newly Submitted Claims**

9 Claims 31-38 have been newly submitted and are believed to be allowable.

10

11 **Conclusion**

12 It is respectfully submitted that all claims are in a condition for allowance,
13 and action to that end is requested. The Examiner is requested to telephone the
14 undersigned if that would be helpful in expediting allowance.

15

16 Respectfully Submitted,

17

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1 **Amended Claims, Marked to Show Changes**

2 **(Amended)** An apparatus comprising:

3 a substrate having [a] first [elongated edge] and [a] second [elongated edge]
4 opposite edges [, wherein the elongated edges are opposite one another];

5 a plurality of memory devices disposed on the substrate; [and]

6 a plurality of channels extending between the opposite edges [from the first
7 elongated edge to the second elongated edge], wherein each of the plurality of
8 memory devices is coupled to one of the plurality of channels; and

9 electrical contacts at the opposite edges of the substrate configured to allow
10 communications through the channels via the electrical contacts.

11

12 **(Amended)** An apparatus as recited in claim 1 wherein the substrate
13 has one or more surfaces and the memory devices are mounted on such one or
14 more surfaces of the substrate. [substrate includes a plurality of electrical contacts
15 along the first and second elongated edges.]

16

17 **(Amended)** An apparatus comprising:

18 a first substrate having a plurality of memory devices disposed thereon and
19 a first channel portion extending across the first substrate, the first substrate
20 having opposite ends and contacts at the opposite ends to allow communications
21 through the first channel portion via the contacts at the opposite ends of the first
22 substrate;

23 a second substrate having a plurality of memory devices disposed thereon
24 and a second channel portion extending across the second substrate, the second
25 substrate having opposite ends and contacts at the opposite ends to allow

1 communications through the second channel portion via the contacts at the
2 opposite ends of the second substrate; and

3 a first connector configured to communicatively couple the first channel
4 portion to the second channel portion through at least some of the contacts of the
5 first and second substrates, wherein the first connector [includes a first slot that

6 receives an edge] engages contacts at a first of the ends of the first substrate and [a
7 second slot that receives an edge] engages contacts at a first of the ends of the
8 second substrate;

9
10 **19. (Amended)** An apparatus as recited in claim 7 further including a
11 second connector [having a first slot that receives an edge] that engages contacts at
12 a second of the ends of the first substrate and [a second slot that receives an edge]
13 engages contacts at a second of the ends of the second substrate [, wherein the

14 edges received by the second connector are on the opposite side of the substrates

15 from the edges received by the first connector].

16
17 **21. (Amended)** An apparatus comprising:

18 a motherboard; and

19 [a plurality of pairs of memory modules coupled to the motherboard, each
20 pair of memory modules including:]

21 a first memory module having contacts at opposite ends thereof, a first
22 channel portion extending across the first memory module between the contacts;

23 a second memory module having contacts at opposite ends thereof, a
24 second channel portion extending across the second memory module between the
25 contacts; [and]

1 a first connector coupling the first memory module to the second memory
2 module through contacts at first ends of the first and second memory modules; and
3 [, wherein the first connector includes a first slot for receiving an edge of the first
4 memory module and a second slot for receiving an edge of the second memory
5 module.]

6 a second connector that engages contacts at the second ends of the first and
7 second memory modules.

9 **24. (Amended) A method comprising:**

10 arranging channel portions on a substrate such that the channel portions
11 extend [from one edge of the substrate to the] between opposite edges of the
12 substrate;

13 arranging contacts at the opposite edges of the substrate to allow
14 communication through the channel portions;

15 arranging channel portion conductors such that the length of the channel
16 portion conductors between opposite edges of the substrate is approximately
17 equal; and

18 coupling together a pair of such substrates using a connector, a channel
19 extending across the pair of substrates and the connector.